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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/720,720	02/28/2001	Richard Spitz	10191-1614	3872

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EXAMINER

TRAN, BINH X

ART UNIT	PAPER NUMBER
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1765

62

DATE MAILED: 10/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/720.720

Applicant(s)

SPITZ ET AL

Examiner

Binh X Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory maximum of thirty (30) days will be timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. (See 37 CFR 1.704(b).)

Status

- 1) ☒ Responsive to communication(s) filed on 28 February 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1-25 and 27-30 is/are rejected.
- 7) ☐ Claim(s) 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f):
a) ☐ All b) ☐ Some * c) ☐ None of
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

ATTACHED SHEETS

1. ☐ Notice of References Cited (PTO-89)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-104)
3. ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____

4. ☐ International Preliminary Report on Patentability (PCT/ISA/210)
5. ☐ International Search Report (PCT/ISA/210)
6. ☐ Other _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 17, 20-21, 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 17, "includes one of an interhalogen compound, which is one of in a gaseous state and has been converted to the gaseous state" (emphasis added) is vague and indefinite. The examiner does not understand why any one need to convert to the gaseous state if it is one of in the gaseous state.

While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill* 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The term "fluorine-noble gas compound" in claim 17 is used by the claim to mean "including at least one of chlorine trifluoride, bromine trifluoride, iodine pentafluoride," while the accepted meaning is "a compound having fluorine element and noble gas element (noble gas includes helium, argon, neon, xenon and radon)."

In claim 20 "diluted with at least one of an inert gas and helium" (emphasis

added) what is at least one of an inert gas and helium is not clear.

In claim 20, "to control at least one of an aggressiveness of the gaseous etching" (emphasis added) is subjective, vague and indefinite.

In claim 21, "a defined temperature" is subjective, vague and indefinite.

In claim 29, "an elevated temperature" is subjective, vague and indefinite.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 16-25, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tai et al. (US 6,162,367) in view of Farnworth et al. (US 6,136,137)

Tai disclose a method for substantially eliminate impurities, the method comprising the steps f:

providing a silicon wafer having a surface;

selectively etching at least one silicon element on the surface of the silicon wafer by bring at least an area of at least one silicon element into contact with gaseous etching medium for etching silicon selectively in a chemical reaction, wherein the gaseous products are produced during the step of selectively etching (col. 6 lines 59 to col. 7, col. 3 lines 22-29).

Tai does not disclose that the silicon surface is sawn-out part of a silicon wafer.

part of the silicon wafer (Fig. 2, col. 4 lines 58-61). It would have been obvious to one of

Art Unit: 1765

having ordinary skill in the art, at the time of invention, to modify Tai in view of Farnworth by using a silicon surface that is sawn-out part of a silicon wafer because Tai is not particular about his silicon surface and therefore any silicon surface would produce an expected result. Further the use of sawn-out part of a silicon wafer is well known in the semiconductor art.

Respect to claim 17, Tai teaches that the etching medium includes bromine trifluoride (BrF_3) interhalogen compound or fluorine noble gas compound include XeF_2 (col. 2 lines 55 to col. 3). Respect to claim 18, Tai disclose the gaseous products include SiF_4 (silicon tetrafluoride, col. 3 lines 25-27). Respect to claim 19, Tai disclose the pressure of 1 Torr (Note: 1 Torr = 1.333 mbar, read on the range of 0.1 mbar to 1,000 mbar; See col. 3 line 54-56). Respect to claim 20, Tai teaches to diluted the etching medium with xenon (read on at least one of an inert gas) to control the etching medium concentration and etching rate (col. 4 lines 50-67). Respect to claim 21, Tai teaches to covert liquid phase BrF_3 (at room temperature) to gaseous phase base on a vapor pressure (col. 2 lines 55 to col. 3).

Respect to claim 22, Tai fails to disclose that the silicon element is sawn form the silicon wafer before performing selectively etching. However Tai teaches the step of selectively etching the silicon element. Farnworth teaches that silicon element (14) is sawn from the silicon wafer (12) before the step of selectively etching. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify

Tai to disclose that the silicon element is sawn from the silicon wafer before the step of selectively etching.

and therefore any silicon surface would produce an expected result. Further the use of sawn-out part of a silicon wafer is well known in the semiconductor art.

Respect to claim 23, Farnworth teaches the silicon wafer (12) is attached to a carrier (50), and the carrier is a sawing sheet clamped into a frame (48) (Fig 3A-Fig 4D). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tai in view of Farnworth, by attaching a wafer to a sawing sheet clamped into a frame because this would cut the wafer into separated component. Further Tai is not particular how the silicon component is cut. Therefore any technique would produce an expected result.

Respect to claim 24, Farnworth teaches that the silicon element (14) is left on the carrier after the silicon element has been sawn out and treated while still attached to the carrier (col. 5-6). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tai in view of Farnworth, leaving and treating the silicon element on the carrier after it has been sawn out because Tai is not particular how the silicon component is cut, therefore any technique would produce an expected result.

Respect to claim 25, Farnworth teaches the step of expanding the sawing sheet after sawing out the plurality of silicon element (14) and before the step of selectively etching, wherein the frame is used as an expansion frame (col. 5-6, Fig 5). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tai in view of Farnworth by expanding the sawing sheet because

the sawing sheet is used to expand the silicon element, therefore any

Respect to claim 27, Tai teaches the step of adjusting an etching rate while selectively etching the silicon element by adjusting temperature (col. 3 lines 40-45).

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tai in view of Farnworth as applied to claim 16 above, and further in view of Butterbaugh et al. (US 6,124,211).

Respect to claim 28, Tai discloses that the volatile SiF₄ is produced during the step of selectively etching. However, Tai does not explicitly teach that the gaseous reaction products are removed during the step of selectively etching. Butterbaugh teaches that volatile SiF₄ is produced during silicon etching and it is removed during the step of etching (Fig 3). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tai in view of Butterbaugh by removing the gaseous reactions products because it will help to increase the concentration of the etchant which result in increasing etching rate.

6. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tai in view of Farnworth as applied to claim 16 above, and further in view of Barth (US 5,763,326)

Tai and Farnworth do not disclose the step of selectively etching includes selectively etching an edge of a power diode. Barth discloses a step of selectively etching the edge of the power diode in order to develop the blocking ability of the p-n junction (col. 4). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Tai in view of Farnworth by selectively etching an edge of the

Allowable Subject Matter

7. Claim 26 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. Claim 29 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

EXAMINER
BINH X TRAN
FBI/DOJ